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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY OCCKET NO.	CONFIRMATION NO.
09/437,607	11/10/1999	RUFUS L. CHANEY	1797.0090005	8216

4372 7590 08/13/2002

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EXAMINER	
IBRAHIM, MEDINA AHMED	
ART UNIT	PAPER NUMBER
1638	21

DATE MAILED: 08/13/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/437,607	CHANEY ET AL.	
	Examiner	Art Unit	
	Medina Ibrahim	1638	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 May 2002* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-48* is/are pending in the application.

4a) Of the above claim(s) *5-7,19-37 and 41-47* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,8-18,38-40 and 48* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *20* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Continued Prosecution Application

1. The request filed on 5/22/02 for a Continued Prosecution Application (CPA) under 37 CFR 1.53(d) based on parent Application No. 09/437, 607 is acceptable and a CPA has been established. An action on the CPA follows. Amendment C has been entered. The IDS of 5/22/02 has been considered.

Claims 1-48 are pending in this application.

Claims 1-4, 8-18, 38-40, and 48 are under examination.

Claims 5-7, 19-37, and 41-47 remain withdrawn from consideration as being drawn to a non-elected invention.

Terminal Disclaimer

2. The terminal disclaimer filed on 05/09/02 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of US Pat. No. 5, 711, 784 has been reviewed and is accepted.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686

F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

3. Claims 1-4, 8-18, and 34-40 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-12 of U.S. Patent No. 5, 944, 872. Although the conflicting claims are not identical, they are not patentably distinct from each other because the novelty of the invention in both cases is the use of hyperaccumulator plants including Alyssum plant species for the recovery of metals including Ni from a metal contaminated soil. It is well within the level of one skilled in the art to manipulate soil conditions to obtain optimum range of soil pH, Ca, Mg concentrations, or chelating agents to increase the availability of a specific metal and its uptake by the plant, so that the maximum amount of the metal can be recovered. Therefore, the subject matter instantly claimed, a method for selectively increasing the amount of metal, including Ni, from Ni-contaminated soil comprising cultivating at least one hyperaccumulator plant, including specified Alyssum species, in a soil having a soil pH elevated from an initial pH to a raised pH of at least 5.6 with at least one agent selected from the

group of claim 4, Ca concentration of between about 20%-80%, harvesting said plant, and recovering Ni from said harvested plant by drying and combusting the harvested plant, wherein at least about 0.1%, 2.5%, 3.0%, and 4.0% (on dry wt. basis) of the above ground tissue is Ni, and whereby the concentration of Ni in the tissue exceeds the concentration of Ni in the soil by a factor of 2, 3, or 4, would have been obvious over the subject matter claimed, a method for recovering Ni from soil containing Ni, the method comprising cultivating Alyssum plants in said soil under conditions of soil pH maintained within a range of 4.5 to 6.2, an exchangeable Ca concentration of 20% lower than the exchangeable Mg concentration, chelating agents, ammonium-containing fertilizer, harvesting said Alyssum plant, and recovering the Ni from said harvested from the harvested plant, wherein at least about 2.5% (on dry wt. basis) of the above ground tissue is Ni, in the patent.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to

the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1-4, 8, 12-13, 16-18, 38-40, and 48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Raskin et al (5, 785, 735, filed June 1, 1994).

Raskin et al teach a method for removing lead from lead-containing soil comprising soil treatments including soil pH manipulation to increase the availability of said metal to plant roots, cultivating Brassica juncea in said soil, whereby the concentration of lead accumulated in the shoots is 30 fold higher than the lead concentration in the soil (Figure 1A; column 10, Table 1). Raskin suggests that preferred metals for their method include Ni, Cr, Cd, and Zn (column 2, lines 20-21) and preferred plants include Alyssum species (column 4, 2nd full paragraph). Raskin also teaches that treating the soil with lime before sowing to maintain soil pH of 5.8-6.2 will optimize growth of Brassicaceae plants. Raskin suggests that pH may be elevated for optimal growth (col. 7, line 58-62) and lowered for increased metal mobility (col. 8, throughout). Raskin teaches balancing between higher pH for optimal Brassicaceae growth and lower pH for increased metal availability (col. 8, lines 25-33). Therefore, Raskin suggests that given a particular initial soil pH, a step of elevating the pH was known for increasing Brassicaceae growth while balancing the pH, especially towards harvest for increased metal mobility. Raskin et al suggests optimum soil pH for Brassicaceae metal accumulators, and therefore, decreasing or elevating soil pH depends upon the

initial soil pH and upon the specific heavy metal to be removed. While Raskin et al do not explicitly teach a "hyperaccumulator", the Brassica species disclosed by Raskin fit the definition (see page 8, Table 4 of the Biorecovery paper provided by Applicants) of a "lead hyperaccumulator" plant, since the plants have been shown to accumulate more than 1000ug/g of lead (Raskin, column 8, Table 1).

Applicants' arguments in pages 7-8 of the response have been fully considered but are not found persuasive for the reasons of record. In addition, since Raskin clearly teaches balancing between the optimum soil pH of 5.8-6.2 for the production (column 7, lines 58-60) and the optimum pH of 4.5-5.5 for metal recovery (column 8, lines 1-2), elevating the pH of the soil from an initial pH to a pH of "at least 5.6" is within the range of the optimum pH conditions disclosed by Raskin. Therefore, one skilled in the art would have been motivated to use a soil pH of between 5.5 and 5.8 for high recovery of metals, with a reasonable expectation of success. Therefore, the rejection is maintained.

Claims 1-4, 8-18, 34-40, and 48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Raskin et al (5, 785, 735, filed June 1, 1994) in view of Brooks et al (Vegetation 45, pp. 183-188, 1981).

Raskin et al teach a method for removing lead from lead-contaminating soil with Brassicaceae plant as discussed above. Raskin et al do not explicitly teach Ni accumulation by Alyssum species.

Brooks et al teach hyperaccumulation of Ni from a Ni-contaminated soil by different species of Alyssum including A.malaitanum, A.serpyllifolium, A. bertoloni, of claims 9 and 14 (pages 186-188, Results and discussions) and effect of Ca concentration on Ni uptake, wherein A.malacitanum accumulated 2.0% of Ni (dry wt. basis) in the leaves. Therefore, it would have been obvious to use the method of removing metals from metal-contaminated soil using a Brassicaceae plant and how to manipulate soil conditions including soil pH as taught by Raskin et al, and to modify by incorporating the specific teachings by Brooks et al for how to selectively remove Ni from Ni-contaminated soil by using specific Alyssum species, to develop optimum method for the recovery of a high amount of Ni, with reasonable expectation of success. One skilled in the art would have been motivated to use one or more Alyssum species for the extraction of metals because of the large number of Alyssum species known as metal hyperaccumulators. Thus, the claimed invention as whole was clearly *prima facie* obvious.

Applicants' arguments have been fully considered by are not persuasive for the reasons of record. The Examiner maintains that the combinantion of the teachings by Raskin and Brooks render the claimed invention obvious, absent any clear and convincing evidence to the contrary. Therefore, the rejection is maintained.

The art made of record and not relied upon is considered pertinent to applicant's disclosure. US 5, 917, 117 teaches inducing hyperaccumulation of metals in plant shoots by manipulating soil conditions such as soil pH, chelating agents, and herbicides. US 6, 313, 374 disclosed phytoremediation of a metal contaminated soil using pelarogonium sp as

hyperaccumulator. US 5, 853, 576 disclosed extraction of metals from metal containing aqueous medium by using Brassica juncea seedlings.

Remarks

No claim is allowed.

Papers relating to this application may be submitted to Technology Sector 1 by facsimile transmission. Papers should be faxed to Crystal Mall 1, Art Unit 1638, using fax number (703) 308-4242. All Technology Sector 1 fax machines are available to receive transmissions 24 hrs/day, 7 days/wk. Please note that the faxing of such papers must conform with the Notice published in the Official Gazette, 1096 OG 30, (November 15, 1989).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Medina A. Ibrahim whose telephone number is (703) 306-5822. The Examiner can normally be reached Monday -Tuesday from 8:00 AM to 5:00 PM and Wednesday-Thursday from 9:00AM to 3:00PM

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Amy Nelson, can be reached at (703) 306-3218.

Any inquiry of a general nature or relating to the status of this application should be directed to the receptionist whose telephone number is (703) 308-0196.

August 9, 2002
mai

Phuong Bui 8/12/02

PHUONG T. BUI
PRIMARY EXAMINER